

**Abstract**

A method and apparatus for measuring relative humidity of a mixture that provides a quick response time for thermal lag while affording protection to fragile sensors. In one aspect, the invention is an apparatus comprising: a chamber having a membrane covering an opening in the chamber, the membrane being permeable to water vapor while impermeable to liquid water; a humidity sensor for measuring relative humidity of the mixture within the chamber; a first temperature sensor for measuring a temperature relating to the mixture within the chamber; a second temperature sensor for measuring temperature of the mixture at a point exterior to the chamber; and a processor for receiving signals representing the measurements taken by the humidity sensor, the first temperature sensor, and the second temperature sensor and programmed to calculate relative humidity of the mixture at the point exterior to the chamber as a function thereof. The internal surfaces that form the chamber volume are preferably constructed of nonabsorbent material.